



# Lloyds Bank Review



JANUARY 1959



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# **LLOYDS BANK LIMITED**

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*The Bank is not necessarily in agreement with the views expressed in articles appearing in this Review. They are published in order to stimulate free discussion and full inquiry.*

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# Soviet Trade and Soviet Aid

By Alec Nove

THE U.S.S.R. has been increasingly active in the field of foreign trade, and has recently also figured as a lender at low interest rates to countries of doubtful political allegiance. In the West, it is widely believed that in their foreign trade the U.S.S.R. and other Soviet bloc countries are predominantly guided by political considerations and that the recent trends simply mean an intensification of cold war on the economic front. It is hoped to demonstrate in the course of this article that such a view is greatly over-simplified and in some respects so wide of the mark as to be misleading.

However, before attempting interpretations, it is desirable to establish some groundwork of fact. This no longer presents quite the difficulties to which one was accustomed. Thus, Soviet foreign trade figures for the three years 1955 to 1957 are available in great detail from official sources. These figures saw the light of day during 1958 and were the first trade returns published in the Soviet Union since the outbreak of the second world war. As for aid, there has been a series of Western publications which set out the agreements so far concluded. One of the best of these is the U.S. State Department's *The Sino-Soviet Economic Offensive in the Less Developed Countries*, released in May, 1958. In the various tables that follow the aim is to present to the reader the basic statistical data.

One point needs to be cleared up first. It will be necessary to cite a number of figures in roubles and it is important to explain what these roubles are. Soviet foreign trade statistics are supposed to be expressed in terms of world prices converted into roubles at the official rate of exchange (11·20 to the pound, 4 to the U.S. dollar). Therefore it is possible, more or less, to divide any of the rouble figures by four to convert them into dollars or by eleven to convert them into sterling.

The modifying phrase "more or less" is deliberate. Thus, the "world prices" are not necessarily those actually current. For example, in deals between Soviet bloc countries, according to a statement made verbally to the writer of these lines, the

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The author is Reader in Russian Social and Economic Studies in the University of London.

*previous* year's world prices are used as the basis for any given year's transactions, while deals with the West are doubtless entered in the trade returns at the prices at which the given transactions actually took place (e.g. in trade with the United Kingdom in the actual sterling prices converted into roubles at the rate of 11.20). None the less, four roubles to one dollar is approximately correct as a conversion factor for foreign trade statistics.

The *internal* value of the rouble is quite a different matter. It is certainly much less than 25 American cents. Consequently, book-keeping adjustments have to be made by the Soviet budgetary authorities, since, at the official exchange rate, in relation to internal prices, goods are exported and imported "cheap". The existence of this quite unrealistic nominal exchange rate for foreign transactions makes it virtually impossible to identify those commodities which are being sold at real—as distinct from nominal—loss, if there be any. Hence, if dumping were suspected it could never be proved, and Soviet economists must find it hard to calculate the relative advantage of this or that trade transaction.

The growth of Soviet trade since 1950 can be conveniently summarized in the following table:

	<i>(Thousands of million roubles, f.o.b.)</i>				
	1938	1950	1955	1956	1957
Exports, total	1.0	7.2	13.9	14.4	17.5
Imports, total	1.1	5.8	12.2	14.5	15.8
Exports to Soviet bloc	—	6.0	10.8	10.6	12.9
Imports from Soviet bloc	—	4.5	9.6	10.7	11.1
Exports to rest of world	—	1.2	3.0	3.8	4.6
Imports from rest of world	—	1.3	2.6	3.8	4.7

Soviet sources<sup>1</sup> make possible the reconstruction of the following volume index for total trade turnover:—

1938	..	..	..	100
1950	..	..	..	254
1955	..	..	..	496
1956	..	..	..	557
1957	..	..	..	620

<sup>1</sup> *Vneshnaya Torgovlya* Nos. 4 and 8 of 1958.

This implies that prices in 1957 were about two and a half times as high as in 1938 (if the index for that year were taken as 100, the 1957 figure would be 256).

A more detailed analysis by country and by commodity may be found in Tables A and B (pages 7 and 8).

### TRADE WITHIN THE SOVIET BLOC

Because of the greater interest in the impact of Russian trade policies on the non-Soviet world, only a brief reference will be made to Soviet dealings with their communist partners. To ignore this sector entirely, however, would be to omit an essential part of the picture, and not only because the bulk of Soviet trade takes place within the Soviet bloc. Statistics may

TABLE A  
*Soviet Trade by Country*  
(Millions of Roubles)

	1955		1956		1957	
	Imports	Exports	Imports	Exports	Imports	Exports
<b>Total, All Countries</b>	<b>12,242</b>	<b>13,874</b>	<b>14,453</b>	<b>14,446</b>	<b>15,751</b>	<b>17,526</b>
<b>Total, Bloc Countries</b>	<b>9,604</b>	<b>10,827</b>	<b>10,744</b>	<b>10,642</b>	<b>11,075</b>	<b>12,925</b>
<i>of which:</i>						
East Germany	2,026	1,915	2,505	2,285	3,057	3,448
China	2,574	2,993	3,057	2,932	2,953	2,176
Czechoslovakia	1,546	1,424	1,586	1,495	1,542	2,205
Poland	1,147	1,727	1,133	1,429	1,024	1,723
Hungary	586	461	483	507	427	999
<b>Total, Rest of World</b>	<b>2,638</b>	<b>3,047</b>	<b>3,709</b>	<b>3,804</b>	<b>4,676</b>	<b>4,601</b>
<i>of which:</i>						
U.K.	284	677	298	593	448	756
Finland	511	425	585	459	661	602
France	144	239	202	279	190	268
German Fed. Rep.	95	117	272	167	247	286
Iceland	40	41	50	40	55	46
Yugoslavia	70	66	199	276	227	292
Canada	11	8	98	9	36	17
United States	2	95	19	109	41	64
Argentina	113	96	52	77	83	19
Cuba	143	0	59	0	188	0
Uruguay	40	1	49	11	73	1
Turkey	21	30	26	24	22	36
Afghanistan	44	54	61	73	83	73
Burma	67	1	49	17	36	26
India	18	29	73	162	168	339
Indonesia	15	0	52	1	79	22
Malaya	87	0	336	1	195	2
Egypt and Syria <sup>1</sup>	62	45	207	160	466	347
Ghana	46	0	33	0	76	0
Morocco	0	0	4	6	21	3
Iran	76	77	61	77	74	127
Yemen	0	0	0	1	3	5
Union of S. Africa	38	0	51	2	107	1
New Zealand	16	0	34	0	32	0

Source: Soviet official trade returns.

<sup>1</sup> United Arab Republic.

give the impression that trade with bloc countries has been relatively stagnant since 1955; but this is the product of some special circumstances and will certainly not be typical of the future.

The development of trade with other communist countries has been affected by the following special factors:

- (a) The 1956 troubles in Hungary and Poland. These led directly to a drop in Soviet imports from these countries,<sup>1</sup> and also to a major change in Soviet commercial policy towards all the satellites. While in earlier years the U.S.S.R. drew considerable advantages from dealings with them (through unfair prices, reparations deliveries from ex-enemies, etc.), all this was changed. Past debts were largely cancelled, trade treaties revised, large new credits granted. In 1957, the U.S.S.R. had a very big export surplus with the European satellites, and particularly with Hungary, Poland, East Germany and Czechoslovakia (see Table A).
- (b) China was, until after 1955, a large recipient of Soviet aid. In 1955 alone, the Chinese budget shows aid receipts of \$600 millions. Now the flow is the other way: in 1957 a sharp drop in Soviet exports led to a large deficit in trade with China, making it appear that China was aiding the U.S.S.R. to aid the satellites. She was certainly repaying past loans. A relative slowing down in Chinese industrialization was experienced in 1957, affecting her imports of equipment, which are derived largely from the Soviet Union. In 1958, however, the pace of Chinese development was resumed at phenomenal speed, and it is clear that her imports from the U.S.S.R. and industrialized satellites will now again increase rapidly. A trade agreement to that effect has, in fact, been reported.<sup>2</sup>
- (c) Beginning in 1956, the process of integrating the long-term plans of the Soviet bloc, on the basis of deliberate specialization, passed from the realm of slogans into practical effect. The new Soviet plan (1959-65) envisages an increase of over 50 per cent. in the exchanges within the bloc over a period of seven years. But these joint arrangements were still being negotiated in 1957, and had not yet had time to affect the actual course of trade.

<sup>1</sup> The effect of the sharp drop in Soviet imports of coal from Poland may be seen in Table B.

<sup>2</sup> *Vneshnaya Torgovlya* No. 10/1958 refers to this agreement, and also gives impressive figures about trade between the industrialized satellites and China.

A high proportion of the exportable surpluses of the U.S.S.R. and of its partners is necessarily destined for intra-bloc exchanges. Thus, the U.S.S.R. takes the lion's share of the machinery and equipment sold by the industrialized satellites. The figures below demonstrate this, as well as the great importance to the U.S.S.R. of her relations with East Germany.

Most of Soviet machinery exports go to the less developed countries within the bloc, China taking 40 per cent. of the total even in 1957. China also imports heavily from East Germany and Czechoslovakia. The bulk of Soviet exports of such commodities as coal, iron ore, oil and grain, are destined for the European satellites, and these countries will rely increasingly on the U.S.S.R. for these and many other materials. Their economies and their plans will depend increasingly on each other. This must set a limit to the potentialities of trade expansion with the outside world, the more so as the build-up of internal economic might is given the very highest priority in Soviet planning.

Nor should it be overlooked, when Soviet aid programmes to less developed countries are considered, that the U.S.S.R.'s aid to China up to 1955, and to European satellites in 1956/7, has been on a scale which overshadows all that has so far actually been loaned to the outside world.

#### **SOVIET TRADE WITH THE OUTSIDE WORLD— PATTERN AND MOTIVATION**

As is clear from the figures in Table A, Soviet trade with countries outside the Soviet bloc has grown very rapidly indeed in recent years, and it is necessary to consider why this is so. Part of the increase is due to two fairly obvious factors which hardly require analysis. One is the artificially low level of trade in the early 1950's caused by the cold war and the strictly autarkic tendencies associated with it, and with Stalin's peculiar mentality. The lowering of these artificial barriers naturally

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#### *Soviet Imports of Machinery and Equipment, 1957*

(Millions of roubles)

Total	3762
<i>of which from:</i>	
East Germany	1598
Czechoslovakia	490
Poland	366
Hungary	308

led to a greater flow of goods in both directions. The second factor is the growth in the sheer size of the economies of the Soviet countries. While this growth was not consciously designed to stimulate trade, and indeed was often subordinated to autarkic aims, the process of growth was necessarily uneven. Shortages developed in some sectors and surpluses in others, so that an increased demand for imports was accompanied by a growth in exportable surpluses. For example, the Soviet Union has in recent years been able to export pig iron, much of which went to the United Kingdom, but has found it necessary to import certain types of steel from Western Europe. However, no one suggests that this is the whole story, and we must probe deeper.

Those who believe that economic warfare is the be-all and end-all of Soviet foreign trade policy would clearly not go so far as to deny that the Soviet countries need certain products which are not available within their borders, such as copper or rubber. But they would argue that the essence of Soviet policy does not lie in this kind of transaction, that the large expansion of trade with the outside world since the death of Stalin must be explained by considerations of political warfare, and that the particularly rapid growth of trade with under-developed and politically sensitive countries conclusively proves this. The political aims pursued in this way are usually defined as: increasing the economic and eventually political dependence of countries on the U.S.S.R.; the introduction into these countries of technical and trade personnel for purposes of subversion; inflicting damage wherever possible on Western economic interests and political influence. Sometimes it is argued that the Russian planners are also endeavouring to increase discontent in the primary producing countries by forcing down prices of certain materials.

On this interpretation, any Soviet economic deal should, *prima facie*, be regarded as political. Indeed, those unwilling to accept this argument in full are often met with the pitying retort: "My dear fellow, *everything* they do is political". It should be made clear that no attempt is being made to put the *opposite* argument. It is not suggested that Soviet trade policy is determined by purely economic considerations. Nevertheless, the view summarized above is often misleading, and is apt to cause misunderstanding of what Soviet traders actually do.

To begin at the beginning, it is surely essential to define more closely the word "political". There is indeed a sense in which all that happens in the U.S.S.R. is connected with

TABLE B  
Soviet Trade: Commodity Composition  
EXPORTS (incl. re-exports)

	1938	1955	1957
<b>A. Machinery and equipment (Mill. R.)</b>	<b>51</b>	<b>2,396</b>	<b>2,609</b>
Equipment for complete factories	—	1,107	1,288
Tractors and agricultural machinery	3	263	191
Motor vehicles and equipment	38	463	423
<b>B. Metals and manufactures (Mill. R.)</b>	<b>16</b>	<b>1,734</b>	<b>2,576</b>
Pig iron ('000 tons)	6	1,149	1,278
Rolled steel	53	1,511	1,923
Pipes	3	186	207
Copper (incl. wire)	—	37	61
Aluminium	—	42	85
Tin	—	2	18
Lead	—	26	55
Zinc	—	36	72
<b>C. Ores and concentrates (Mill. R.)</b>	<b>22</b>	<b>462</b>	<b>736</b>
Iron ore ('000 tons)	7	8,818	10,773
Manganese ore	446	851	806
Chrome ore	—	158	259
<b>D. Fuel (Mill. R.)</b>	<b>90</b>	<b>1,318</b>	<b>2,594</b>
Coal ('000 tons)	52	2,875	6,997
Anthracite	371	1,437	1,775
Coke	—	1,617	2,196
Crude Oil	—	2,916	5,923
Oil products	1,400	5,070	7,758
<b>E. Timber and Paper (Mill. R.)</b>	<b>207</b>	<b>698</b>	<b>925</b>
Sawn timber ('000 cubic metres)	3,209	2,338	3,457
Pit props	1,259	839	817
Pulp	1,127	547	591
Cellulose ('000 tons)	—	137	151
<b>F. Textile Materials, etc. (Mill. R.)</b>	<b>43</b>	<b>1,387</b>	<b>1,220</b>
Raw cotton ('000 tons)	20	337	319
<b>G. Grain (Mill. R.)</b>	<b>217</b>	<b>1,134</b>	<b>2,264</b>
	2,000	3,683	7,414
<b>H. Industrial consumers' goods (Mill. R.)</b>	<b>80</b>	<b>416</b>	<b>578</b>
Cotton fabrics (Mill. met.)	n.a.	139	178
<b>I. Other (Mill. R.)</b>	<b>295</b>	<b>4,329</b>	<b>4,024</b>
Meat and meat products ('000 tons)	—	11	77
Furs (Mill. R.)	96	155	151
<b>TOTAL (Mill. R.)</b>	<b>1,021</b>	<b>13,874</b>	<b>17,526</b>



TABLE B—(contd.)  
Soviet Trade: Commodity Composition  
IMPORTS

		1938	1955	1957
<b>A. Machinery and equipment</b>	<b>(Mill. R.)</b>	<b>376</b>	<b>3,701</b>	<b>3,762</b>
Energetics and electrical	"	33	625	377
Materials moving	"	1	214	144
Light industry (inc. food)	"	4	322	290
Rail locos and rolling stock	"	neg.	460	578
Ships and parts	"	28	1,055	958
<b>B. Metals and manufactures</b>	<b>(Mill. R.)</b>	<b>277</b>	<b>820</b>	<b>1,418</b>
Pig iron	('000 tons)	—	583	152
Rolled steel	"	88	86	723
Pipes	"	24	123	123
Copper	"	State secret		
Tin	"	—	17	22
Lead	"	11	18	28
Cable and wire	(Kms.)	—	13,126	19,800
<b>C. Ores and concentrates</b>	<b>(Mill. R.)</b>	<b>29</b>	<b>1,005</b>	<b>1,813</b>
(Composition is a State secret)				
<b>D. Fuel</b>	<b>(Mill. R.)</b>	<b>13</b>	<b>1,003</b>	<b>835</b>
Coal and coke	('000 tons)	—	9,114	3,794
Oil and oil products	"	—	4,391	4,268
<b>E. Textile materials, etc.</b>	<b>(Mill. R.)</b>	<b>106</b>	<b>666</b>	<b>1,271</b>
Raw cotton	('000 tons)	16	20	109
Raw wool	"	23	47	57
Staple fibre	"	—	26	54
Jute	"	28	20	16
<b>F. Food products and edible materials</b>	<b>(Mill. R.)</b>	<b>138</b>	<b>2,473</b>	<b>2,284</b>
Grain (excl. pulses)	('000 tons)	129	306	153
Rice	"	40	487	371
Oilseeds	"	3	760	716
Meat and meat products	"	3	239	117
Salt herrings	"	7	84	69
Tea	"	17	10	21
Cocoa beans	"	15	14	44
Coffee	"	1	2	5
Sugar	"	—	933	645
Fresh fruit	"	34	133	218
<b>G. Industrial consumers' goods</b>	<b>(Mill. R.)</b>	<b>11</b>	<b>588</b>	<b>1,796</b>
Wool fabrics	(Mill. met.)	—	11	15
Silk fabrics	"	—	25	38
Cotton fabrics	"	—	16	9
Clothing	(Mill. R.)	—	90	587
<b>H. Other</b>		<b>140</b>	<b>1,986</b>	<b>2,572</b>
Natural rubber	('000 tons)	n.a.	35	146
Raw tobacco	"	n.a.	55	91
<b>TOTAL</b>	<b>(Mill. R.)</b>	<b>1,090</b>	<b>12,242</b>	<b>15,751</b>

NOTES—(1) All group totals are in millions of roubles (mill. R.) of contemporary value. Other figures, where possible, are in quantities. (2) Exports and imports are both f.o.b. Sources: Soviet official trade returns, and also *Vneshnaya Torgovlya* No. 4/1958, and No. 8/1958.



political aims defined by the Communist authorities. But to regard all decisions as *directly* political is merely inviting confusion. To illustrate this proposition with an example, let us take the "basic economic task of the U.S.S.R.," which the Soviet leadership repeatedly defines as that of overtaking at the earliest date the economic might of the United States. This task is undeniably political in its motivation. But once it is accepted, it has a logic of its own. Thus it may be decided that it is essential, in pursuit of this basic aim, to increase the output of steel. This in turn requires development of new sources of iron ore in a remote area. This ore needs to be transported, and so a new railway is built.

These various steps are obviously technical consequentials, and are not in themselves political, even though they are in their origins related to a political aim. It is not helpful to clarity to regard the new railway as a political line, and it is rather more realistic to see it as a means of carrying iron ore from one place to another. This will not cease to be true even if the decision to build the railway is made by the central committee of the Communist party, and if its opening is heralded by a speech by a party leader on a political theme.

In a planned economy of the Soviet type, decisions on economic matters are commonly taken by the political authorities and, even when they are responses to the pressures of technical-economic necessity, always look as if they are taken deliberately as a part of the exercise of arbitrary power. Such decisions are also apt to be exploited wherever possible for political ends. It will be argued that many foreign trade decisions are of this type, that we merely confuse ourselves in always seeking a *direct* political motive for Soviet behaviour in the field of international trade. Undoubtedly, some Soviet behaviour in this field *is* political, but we make it quite impossible for ourselves to identify such behaviour if we assume *ex hypothesi* that all of it is so motivated.

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To illustrate this argument with a more relevant example, let us examine the Soviet sales of tin and aluminium in London, which many in this country and in America believe to be due wholly or largely to cold war considerations. It is important at this point to refer again to Table A, which clearly shows that the Soviet Union had a particularly acute balance of payments problem with the sterling area in 1957. Disregarding, as we must, the Soviet surplus with India, which is the consequence

of Soviet credits to that country and in that sense "unrequited", there was a sizeable Soviet deficit. The visible surplus with the United Kingdom was insufficient to finance purchases of sterling area raw materials (rubber from Malaya, cocoa from Ghana, wool from South Africa and New Zealand, copper from the London market).

The present Soviet shortage of sterling is well known to businessmen who, when they endeavour to sell to the U.S.S.R., find themselves urged to take goods in payment, i.e. to conclude barter deals. To make matters worse, the Soviet planners are faced with the prospect of increasing their sterling expenditure. Thus, the Soviet plans for the chemical industry involve a substantial increase in purchases of machinery from the West, including the U.K.; and the extremely ambitious programme for oil and gas pipe-lines (some 15,000 miles of natural gas pipe-lines alone in the next seven years) may also add to the import bill.

Faced with this situation, the Soviet authorities must seek to increase exports. There must be meetings in Moscow to decide what goods can be spared. Doubtless, the possibility of expanding traditional exports is first examined. There was, in fact, an increase in Soviet sales of timber in London in 1957, but domestic production has barely kept pace with increased internal demand and there seems to be no possibility of a substantial further increase. By contrast, aluminium output has soared, not only in the U.S.S.R. but also in the satellites; Poland, for example, which used to rely on imports from the West, has been stimulated by our strategic controls into creating an aluminium industry and now even has an export surplus. As for tin, China is now regularly supplying Soviet needs, and there seems to have been some to spare. These two commodities were therefore shipped to London. If the above hypothesis is regarded as reasonable, the decisions to sell these products do not seem to require either a more subtle or a more sinister explanation.

The quantities involved would have made a difference to the market in any event. Demand was falling owing to the American recession; prices were being artificially maintained. In such circumstances, the arrival of a large new seller was bound to disrupt the market. It is true that the Russian sellers elbowed existing interests aside, and did not listen to offers of compromise until forced to do so by the threat or imposition of import controls. This seems to have been due in part to the familiar lack of flexibility shown on many occasions by Russian

State traders, who are told to sell a given quantity and obey their orders with unimaginative precision. Perhaps they may also have desired to adopt a tough attitude in the anticipation that, without such toughness, existing interests would have refused to make room for them.

No doubt the inconvenience to Western interests will have caused few tears to be shed in the Kremlin. However, the *political* advantages accruing from such tactics are by no means obvious. To be held responsible for a fall in the price of raw materials is no way to win friends and influence people in the producing countries. Thus, on the evidence it does really seem far-fetched to regard these Soviet sales as due in any large measure to political mischief-making.<sup>1</sup> In passing, it is worth recalling that, if Russia's sales of materials tend to force prices down, the growing volume of Russian *purchases* of many basic materials help to maintain prices; it is difficult in the circumstances to attribute a consistent "political" line to Russian traders in the world's commodity markets.

The possible alternative to any commodity export is selling gold. It is believed with good reason that the U.S.S.R. has a large gold reserve, and she is herself a major producer of gold. It may be asked why more of it is not used to finance trading deficits.

Of course, the Russians do in fact sell appreciable quantities of gold, in London and elsewhere, perhaps equal, or nearly equal, to the gold currently being mined.<sup>2</sup> It may be surmised that gold production has fallen, as one result of the big reduction in forced labour. The gold-fields are located in remote arctic areas and it is hard to persuade free workers to go there without paying very high wages. Production costs are probably very high, and it would scarcely seem to make economic sense to expand gold production so as to sell it abroad at present prices. Finally, the Soviet approach to gold is remarkably old-fashioned in spirit, possibly because Karl Marx lived and wrote in the hey-day of the gold standard. Soviet authorities are as reluctant to run down the gold reserve as a traditionally Victorian capitalist to touch his capital. Perhaps they regard it as a vital strategic reserve of foreign currency.

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<sup>1</sup> An interesting historical parallel is with Russian sales of farm produce in the early 'thirties. She was then also accused of dumping and disrupting the falling market. Yet all would now agree that the object of the sales was to pay for the machinery needed for industrialization, and that the Soviet plans, so far from being intended to force prices down, were in fact upset by the unfavourable terms of trade in those years.

<sup>2</sup> The quantity produced is a State secret.

But all this in no way disposes of politics as a factor. Political considerations underlie the whole change, since Stalin's death, towards a less negative attitude to trade. Obviously, politics alone can explain the special economic relations which exist with the satellites and which are now to be extended. Political considerations enter, in varying degrees, into the process of choosing which needs to satisfy by imports, and from which country to obtain a given commodity. The Soviet trade planners generally think in terms of bilateral deals, are not inhibited by most-favoured-nations clauses (which have no meaning where trade is a State monopoly), do not have to respond to the pattern of consumer demand in deciding what to buy.

This last point should not be misunderstood. The Soviet authorities have to provide material incentives to their people, and therefore goods for the shops; in recent years they have done this, *inter alia*, by greatly increasing the volume of imports of food, clothing, and so on. Because of their power to vary retail prices and turnover taxes, however, the authorities can bring supply and demand into balance at levels decided (within broad limits) by themselves. They may therefore choose to buy fish from Iceland rather than from Great Britain, and fish rather than wool cloth, for reasons political in whole or in part. Other examples can readily be found. Thus, wool is bought from South Africa in preference to Australia because of the diplomatic quarrel with the latter. Cocoa has been in urgent demand for years—chocolate is relatively the dearest commodity in Russia compared with Western prices—but the decision to buy more cocoa followed the conversion of the Gold Coast into Ghana. Oranges, which came from Israel before the Suez crisis, are now bought in Morocco. The reasons are not, of course, necessarily only political. For example, Iceland is willing to accept for its fish the kind of goods which the U.S.S.R. can spare. Bilateralism has its logic, as British businessmen may well remember from their experiences in the first years after the war. None the less, there is evident room for political manoeuvre, and opportunity is generally taken to extract political-publicity advantage from the trade deals, whatever their motivation.

How do these considerations apply to the rapid expansion of trade with less developed countries?

The evidence does not permit any generalizations of universal application. Thus trade with Turkey and Iran has followed a largely traditional and wholly unsurprising pattern.

Afghanistan's considerable share in the Soviet aid programme is doubtless politically significant but, geography being what it is, the Russian share in Afghan trade would have been much the same if the Tsar were still on his throne. With Latin America the U.S.S.R. is in substantial deficit. A major effort to expand bloc exports to these countries must be anticipated, but so far the scale of these exports has been modest.

The major expansion of the last few years has affected a relatively short list of countries: India, Burma, Indonesia, the United Arab Republic and a few smaller Middle East countries. This expansion has been closely associated with aid, which in itself sets up the presumption of political motivation. Nor is it a coincidence that these countries are neutralist, or that the growth of trade relations with them has been accompanied by the conversion of the word "neutralist" from a term of abuse to a term of praise in the Soviet political vocabulary.

None the less, there are also some other factors involved, and these must be considered seriously if we are to avoid misleading conclusions about the "burden" to the U.S.S.R. of its trade policies. Details of the commodity composition of the trade may be found in Table C overleaf. This table shows that the bulk of Soviet imports from these countries consists of textile raw materials and foodstuffs. While there have been a few isolated instances of over-buying,<sup>1</sup> these imports have in general been useful to the Soviet economy. A significant and increasing proportion of the goods in Soviet shops is of foreign origin or made of imported materials, originating within the bloc or in the less developed countries.<sup>2</sup> Indeed, this may be an economically rational way of fighting inflation in the one sector in which it can openly manifest itself in the U.S.S.R.—too much purchasing power chasing too few consumers' goods. Imports of cotton from Egypt may seem "purely political"; yet the U.S.S.R., which exports much of its own crop to the industrialized satellites, has been short of this material in recent years for her own cotton industry. (Output actually fell between 1955 and 1957, despite unsatisfied demand). Maybe the decision to purchase Icelandic fish was motivated by a wish to weaken N.A.T.O.; but an exchange of fish for oil can hardly be seen realistically as imposing any burden on the Soviet economy.

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<sup>1</sup> Excessive rice imports from Burma in 1955 were evidently the immediate consequences of the Soviet leaders' visit. They have now been reduced to more rational dimensions.

<sup>2</sup> Relatively few consumers' goods are bought from Western countries, probably owing to the chronic shortage of foreign exchange, which tends to confine purchases to "essentials".

Perhaps it was Stalin's policy of "unnatural" autarky which imposed the burden, while the present policy represents a net economic gain.

TABLE C  
*Composition of Soviet Trade with some Less Developed Countries, 1957*

*All figures in millions of roubles*  
(Note: M and E stands for Machinery and Equipment)

<i>Country</i>		<i>Total</i>	<i>Principal commodities</i>
<b>Afghanistan</b>	<i>Exports</i>	72.5	M and E 34.1; Cotton fabrics 10.3; Oil 9.4; Sugar 8.6
	<i>Imports</i>	82.7	Raw cotton 43.1; Wool 27.8
<b>Burma</b>	<i>Exports</i>	25.9	Cotton fabrics 9.2; Rolled steel 9.0; M and E 4.1
	<i>Imports</i>	36.2	Rice 36.2
<b>Ghana</b>	<i>Exports</i>	0	
	<i>Imports</i>	75.7	Cocoa 75.7
<b>Iceland</b>	<i>Exports</i>	46.3	Oil 32.7; Timber 3.9; Steel 3.4; Pass. cars 2.0
	<i>Imports</i>	55.1	Fish 55.1
<b>India</b>	<i>Exports</i>	338.6	M and E 189.5; Iron and steel 120.9; Rice 11.4
	<i>Imports</i>	167.8	Tea 52.6; Skins 24.6; Wool 22.3; Rope and tackle 16.1; Footwear 10.6; Cashew nuts 10.0
<b>Indonesia</b>	<i>Exports</i>	22.4	Passenger cars and parts 20.2
	<i>Imports</i>	79.1	Rubber 75.3; Tea 1.2
<b>Iran</b>	<i>Exports</i>	126.6	Sugar 42.1; Cotton fabrics 26.7; Timber 18.6; M and E 15.1; Iron and steel 14.3
	<i>Imports</i>	74.1	Wool 27.4; Fruit 13.9; Raw cotton 9.8; Lead ore 9.5
<b>Morocco</b>	<i>Exports</i>	3.4	Oil 2.8
	<i>Imports</i>	21.1	Oranges 21.0
<b>United Arab Republic</b>	<i>Exports</i>	346.3	Oil 109.0; Wheat 93.7; M and E 69.6; Timber 26.6
	<i>Imports</i>	465.4	Raw cotton 419.7; Rice 39.4
<b>Yemen</b>	<i>Exports</i>	5.0	M and E 3.4; Sugar 1.3
	<i>Imports</i>	3.3	Coffee 3.3

Source: Soviet Official Trade Returns.



It is not suggested that the primary *cause* of the rapid expansion of Soviet trade with the less developed countries lies in a desire to enlarge the volume and variety of Soviet retail sales, but at the very least this is a valuable by-product of such trade. Since the Soviet authorities *must* match their monetary incentives with goods in the shops, it probably saves them some burdensome investment effort at home.

Another factor which affects choice of countries is simple and is often overlooked: this is the difficulty which faces the U.S.S.R. and its allies in selling to those less developed countries which have close economic and political ties with the West. These countries generally rely on Western suppliers; they are often reluctant to enter into trade agreements, and indeed may seek to avoid all contact and negotiation with "the reds". Thus, Iraq under Nuri refused diplomatic or trade relations, and both were resumed only after his fall. Again, it is surely obvious that the expansion of Soviet bloc trade with Egypt or Iceland followed—and did not cause—difficulties in these countries' economic or political relations with the West. There has been a close correlation in practice between commercial and political opportunity. Economic advantage and political advantage can often be pursued together.

The industrialized satellites are playing, and will certainly continue to play, a very important rôle in selling to less developed countries. There is evidence of some co-ordination of effort through the so-called Council of Mutual Economic Assistance (C.M.E.A.), and this is often taken as proof that the satellites are integrated into a politically-motivated trade offensive. But countries like Czechoslovakia and East Germany, which import a great deal from outside the Soviet bloc, must make every endeavour to expand exports and do not require C.M.E.A. to tell them so. The task of C.M.E.A. in this respect (with some exceptions, such as arms) may well be that of endeavouring to avoid needless competition and investment duplication.<sup>1</sup> Since their exports consist of manufactures, and especially of engineering products, Czech planners are apt to show amused impatience when accused of selling to under-developed countries for political reasons. Where, they ask, would we have them sell such products?

Politics *do* play a rôle in trade, sometimes (as in the case of arms sales) a dominant rôle. But we must not overlook the importance of the other factors involved.

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<sup>1</sup> And no doubt also deciding on which potentially exportable commodities should be pre-empted for the use of other bloc countries.

### SOVIET BLOC AID TO UNDER-DEVELOPED COUNTRIES

Table D represents an endeavour, necessarily somewhat inexact, to estimate the magnitude of Soviet bloc aid. The totals are given in two ways: including and excluding Yugoslavia. This is because there is a sense in which aid to Yugoslavia was treated—at the time it was given—as aid to a bloc country, and indeed this largely explains why it was cut off when the ideological quarrel broke out.

The first column gives a total of aid offered in recent years, down to mid-November, 1958 (including the Aswan dam offer and a credit agreement with Argentina), amounting to over \$2,000 millions. This figure is generally cited by those who wish to emphasize the magnitude of the “aid drive”. It is the figure which is commonly compared with Western aid, even though the latter always represents goods or money that actually passed in the period in question, and never includes agreements to render aid at some future date. In reality, it is the second column of the table only, the much lower figure of \$700 millions or so (excluding Yugoslavia), which is relevant to such a comparison.<sup>1</sup>

Even this more modest figure is quite misleadingly high. First of all, it does not take into account repayments, or “unrequited” exports from “recipient” countries to the U.S.S.R. Two examples may be cited. Burma has delivered much more rice to the Soviet bloc than has yet been paid for, so that, up to the present, far from receiving any aid, she has “aided” the U.S.S.R., and there should be a minus figure in the second column of Table D. Secondly, Egypt had big surpluses on visible trade with the Soviet bloc in 1956 and 1957. It is true that arms deliveries were omitted from the Egyptian trade returns, but the *full* value of these arms is included in the table as “aid”, whereas an appreciable part has been in fact paid for in cotton.

Secondly, with the interesting exception of some gifts from China, virtually all Soviet bloc aid has consisted of credits, or more precisely of deliveries of goods on credit, while the major part of Western aid consists of *grants*. Obviously, it is quite misleading to compare a \$100 gift with a \$100 loan, even if the latter bears a low rate of interest. It is surely clear that an ordinary commercial credit, such as is constantly granted in business dealings with many countries, is not aid at all and should not be confused with aid. The *only* element of aid in

<sup>1</sup> True, this excludes Soviet aid to *bloc* countries, but comparable figures for the West never include (for instance) U.S. aid to West European countries.



Soviet credits is the difference between the rate of interest charged and the commercial rate.

When these factors are allowed for, Soviet aid programmes may begin to be seen in proper perspective. In his very valuable and careful survey of these programmes,<sup>1</sup> Joseph Berliner has shown that U.S. *grants* in 1956/7 considerably exceeded total Soviet bloc *credits* even to those countries with which Soviet credits were negotiated. He also showed that governmental aid by Western countries even *excluding the United States* to all less developed countries substantially exceeded the value of Soviet bloc credits actually drawn upon. Thus, he estimates the total utilization of Soviet credits in 1957 at between \$160 and 200 millions, while "governmental aid by other free world countries" (that is, other than the United States and excluding

TABLE D

*Soviet Bloc Credit and Agreements with Less Developed Countries*

(Reported up to 20th November, 1958)

Country	Amounts offered and agreed \$m.	Amounts drawn \$m.
Egypt	600	250
Syria	325	130
Afghanistan	175	70
Yemen	45	10
Burma	42	0
India	320	100
Indonesia	250	100
Ceylon	50*	(40)
Nepal	13*	
Cambodia	22*	
Iceland	10	
Turkey	10	
All Latin America	108	
<b>Total excl. Yugoslavia</b>	<b>1,970</b>	<b>700</b>
Yugoslavia	150**	150**
<b>Total incl. Yugoslavia</b>	<b>2,120</b>	<b>850</b>

Sources: First column: U.S. State Department: *The Sino-Soviet Economic Offensive in Less Developed Countries* gives figures up to February, 1958. These have been brought up to date by adding subsequent announcements. These are not always either clear or reliable. The second column represents *estimates* based on necessarily incomplete evidence, and must be regarded as approximate only.

\* These countries have received much of their aid in the form of *grants* from China.

\*\* The total for Yugoslavia represents amounts actually drawn, since outstanding bloc credits have been cancelled.

<sup>1</sup> *Soviet Economic Aid* (Fredrick A. Praeger, for Council of Foreign Relations), New York 1958.

the International Bank) in the year ending June, 1957, was about \$750 millions, of which a large part originated in the United Kingdom.

The remarkable *effectiveness* of the Soviet aid activities is well worth careful consideration—Berliner gives it this in his admirable study—but we should not assist Soviet publicity by exaggerating the extent of the actual aid.

The political value of the aid programme to the Soviet Union is evident, and its attractiveness to the leadership is all the greater because the cost is so small. Much of the credit deliveries have consisted of arms, effortlessly provided from stock. There are also solid economic advantages, which may well have some influence on the aid policy. It facilitates entry into new markets, and, since the repayment is largely to be made in goods, it ensures a long-term flow of commodities to the Soviet bloc, the usefulness of which has been stressed earlier.

A word is not out of place on the nature of the political advantage which the bloc obtains by its aid policy. This is often obscured by the use of "loaded" words like "penetration", which cause melodramatic visions of cloaks, daggers and subversion. There is in fact remarkably little evidence of any direct connection between trade or aid and such things as these; but, of course, these possibilities can never be excluded. The political effects on the minds of men are much more serious. So are the possible *long-term* political consequences.

The low interest rate charged is given much stress in Soviet statements, which carefully omit reference to the fact that most Western aid is not even repayable. Soviet credits have been at around 2½ per cent. on the average, which is similar to the rate charged by the State Bank for short-term loans to Soviet State enterprises.<sup>1</sup> Satellites have sometimes charged more: Czech credits to Indonesia have been at 5 per cent., to India at 4½ per cent. (which, of course, diminishes the "aid" element in these transactions).

The credits cannot cause a strain on the capital market, because there is no capital market. The granting of credits is limited primarily by problems of *resource allocation*, depending on the existence of surpluses and on decisions about priorities in the use of resources available. Soviet planning is extremely ambitious; the seven-year plan for 1959–65 envisages a rise of about 80 per cent. in industrial production, the trebling of the chemical industry, extensive investments in many key sectors

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<sup>1</sup> Long-term investment in the U.S.S.R. is financed by non-repayable grants.

from steel to housing, and so on. China's planned growth is more rapid still.<sup>1</sup> These plans place a heavy strain on available resources. So, in the shorter run, does the need to grant credits to those bloc countries in need of them.

The efforts to achieve rapid internal expansion will probably increase the demand for imports from outside the bloc and will create new surpluses which will be used to pay for them. Hence, Soviet exports of oil, iron ore, aluminium, diamonds, grain and a range of engineering products may be making an increasing impact on the world's markets. But the pressures caused by the self-imposed task of overtaking the West at the earliest date involve a very high priority for internal needs. Correspondingly, they tend to limit the availability of resources for "capital export", for any deliveries of goods which do not entail a speedy equivalent return.

This interpretation by no means excludes the granting of credits in cases where the political (or other) dividends seem disproportionately great. The Aswan dam case is a recent example. Credits to some selected countries will continue. Their future magnitude will doubtless depend in part on the internal strains within the bloc, on the extent to which the Soviet Union has to render aid to other communist States, on the view which the Soviet leaders take of the international situation. But it is necessary to emphasize the limitations, if only to challenge the widely held belief that the U.S.S.R. is giving top priority to a gigantic trade and aid drive and is making major sacrifices to this end, which simply is not so.

This is not to deny that the Soviet leaders are actuated by political motives in their economic policy. Indeed, their great emphasis on the build-up of their own economic might is thoroughly political, and the Soviet leaders are doubtless aware that the rapid growth of Soviet economic potential is one of the principal sources of communism's psychological appeal to countries which have yet to begin the painful process of industrialization.

Alec Nove.

*London School of Economics.*  
*December, 1958.*

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<sup>1</sup> The very rapid rise in China's import requirements is bound to stimulate a Chinese export drive which may, in the next few years, reach alarming dimensions.

# Comments on Company Finance

By R. F. Henderson

THERE are a number of questions on which some light can be thrown by a study of company accounts. How vulnerable were public companies to restrictions of bank credit or of capital issues? How has the growth of large companies compared with that of smaller ones? Have they relied more on retained profits? How important is trade credit? By careful comparison of successive balance sheets and profit and loss accounts and elimination of accounting adjustments, flows of funds can be studied. The Companies Act of 1948 set a minimum standard for the accounts of British public companies, high enough to make it possible to use these as a source of statistical information. A study<sup>1</sup> has now been made of the accounts for the years 1949-53 of all those companies with share capital quoted on a stock exchange in the United Kingdom whose main activity is manufacturing, building or distribution in this country, and the purpose of this article is to set out some of its conclusions.

## I

A survey of sources and uses of funds is valuable in that one can make a complete and balanced assessment of the different major items of expenditure, such as fixed assets and working capital, and of the sources from which they have been financed.

It has been difficult in the past to assess, for instance, the relative importance of retained net income and of investment in fixed assets. In the 1930's it could be argued, either that internal finance was all-important because retained net income apparently exceeded net investment, or that the new issue market was of considerable importance because new issues in total amounted to a substantial proportion of net investment. If all investment in fixed assets were provided out of retained profits

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The author is a Fellow of Corpus Christi College, Cambridge.

<sup>1</sup> This was undertaken at the National Institute of Economic and Social Research. A summary of the results is given in *Company Income and Finance 1949-53* by the N.I.E.S.R. in 1956, for private circulation. A more detailed survey, *Studies in Company Finance*, edited by Professor B. Tew and Dr. R. F. Henderson, is to be published soon by the Cambridge University Press.

it would seem that a policy of cheap money and easy credit would have no significant effects on industrial investment. If, on the other hand, capital issues were of some importance, official policies that assisted revival of the new issue market would be worth while. Such were the problems arising from the fragmentary information then available.

Reasonably complete statistics of sources and uses of funds show that expenditure on items such as building up stocks and extending trade credit to customers bulk large when compared with expenditure on net fixed assets. There were certain special reasons for their importance in the years 1949-53. But even when allowance is made for these, the figures suggest a possible solution to the apparent paradox of the 1930's: even if net investment in tangible assets was less than retained profits, external finance by new issues may have been necessary to provide funds for other purposes. Simply to compare retained profits with some measure of net investment in tangible assets does not provide an answer to the question: "Were retained profits sufficient to finance growth in this period?"

This has implications for the discussion of taxation policies. Only if retained profits are sufficient to finance all uses of funds—all forms of growth expenditure, not just expenditure on tangible assets—can it be argued that it may be possible to increase company taxation without making any significant reduction in the funds available for the finance of the growth of companies. Retained profits of companies were large in the years 1949-53; but when measured against the expenditure—the uses of funds—of these companies they were not overwhelming.

## II

Gross sources and uses of capital funds are shown in Chart 1 (page 23). On this basis it can be seen that retained net income amounted to about one-third of the total, and depreciation allowances to about one-quarter.

Banks provided a very small proportion of funds used. In the light of these figures it is difficult to justify the emphasis placed on the qualitative and quantitative control of bank advances as a method of controlling inflation, instead of the use of more general methods of credit control which, by driving up interest rates, could have restrained new issues and other methods of financing expansion.

Another small item is expenditure on intangible fixed assets, which includes goodwill and trade investments. The

acquisition of other businesses was of minor importance when compared with direct expenditure on tangible fixed assets and on stocks. Companies grew by adding to their factories or building new ones, not to any significant degree by the purchase of other businesses. Take-over bids were important for their effects in stimulating a general rise in dividends after the dividend freeze. They revealed that the market valuation of the shares of many companies which had been complying with official exhortations to keep down their dividends was so far below the real value of the assets of the companies as to constitute a strong temptation to a take-over bid. But the value of assets which were actually acquired in such bids was small when compared with the general growth of companies.

Trade credit, on the other hand, is substantial as a source of funds and even more as a use of funds—much larger than the space usually accorded to it in economic discussion of the finance of industry.

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There are many possible ways of setting out various items in order to discuss the finance of growth. One of them is shown in Chart 2. Here the main changes are the omission of depreciation and replacement expenditure; the subtraction of the increase in trade credit received from the increase in trade credit given, to show the increase in *net* trade credit; and the subtraction from increases in liquid assets of any increase in loans from banks or accruals of dividends and taxation.

This process of “netting out” certain items can be justified on the assumption that some of the flows of funds included in the gross table are almost automatic—depreciation and replacement of fixed assets, for instance, or the expansion, side by side with increased turnover, both of creditors and of debtors. Thus, it may be reasonable to neglect these items and to concentrate on the finance of growth.

The increase in the value of stocks was exceptionally great in this period, as it included the Korean war boom in commodity prices. It is all the more remarkable, therefore, that a net increase in liquid assets was achieved. That this was so was due to big retentions of profits and a significant amount of capital issues.

Now, whether investment is reckoned gross or not, it is quite clear that these quoted companies were making considerable use of external long-term funds to finance additions to assets. They had in reality no surplus of undistributed profits available for the finance of other sectors of the economy.

# SOURCES AND USES OF CAPITAL FUNDS 1949-53

Chart 1

## Gross Sources and Uses

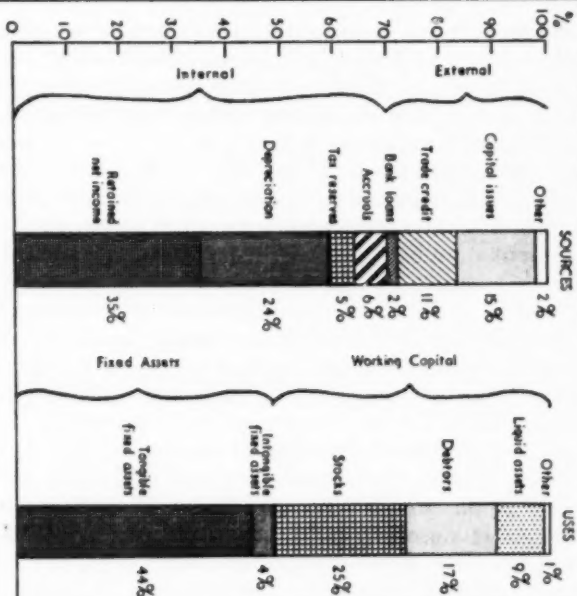
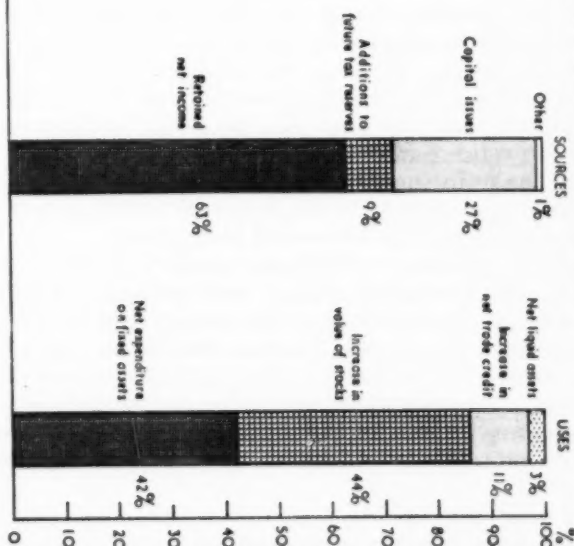


Chart 2

## Finance of Growth of Net Assets





It is often said that the company sector had a substantial surplus of savings over its investment in this period available to finance other sectors. This view is probably based on a misunderstanding of the national income statistics of capital formation. One item which is lacking there, and which it is to be hoped will soon become available, is an estimate of overseas investment by companies. Thus, the tables in the Blue Book entitled "the financing of investment" show only investment in this country as compared with total savings. (Net overseas investment cannot be distinguished from net acquisition of financial assets). Unfortunately, total saving minus investment at home is apt to be described as "the surplus of savings over investment in the company sector, available for the finance of other sectors". But it is obvious that a surplus of saving over investment at home which has in fact been invested overseas is not available for the finance of other sectors.

This overseas investment by British companies has been criticized on the grounds that these funds should have been invested in expansion or modernization of manufacturing capacity at home. It deserves more study. May it not have been, for example, that these companies were compelled to undertake such investment in many cases in order to maintain their markets? Many governments in the British Commonwealth and elsewhere have made no secret of the fact that they were determined to foster home industries. In such circumstances, the effective choice for a British motor company, for instance, was surely not between continuing to build motor cars in Britain and shipping them to Australia, on the one hand, and setting up an assembly and manufacturing subsidiary in Australia on the other hand. It was rather between trying to maintain some stake in the Australian market by setting up a plant there or abandoning it to local assembly and manufacturing plants of American and German competitors.

Much of this overseas investment must have gone into affiliated companies providing selling and servicing agencies. There is considerable evidence that the success both of British and of German exporters of cars, tractors, machinery and other products has largely depended on the provision of first-class sales and service organizations in many overseas markets. Thus a continuous process of overseas investment may well be a necessary prerequisite of expansion in exports in many fields. It is among the largest companies that this overseas investment is most noticeable—a matter worth consideration perhaps in discussion of various possibilities of nationalization or government control over such companies.



Other factors complicate the comparison between company saving and investment as shown in the national income accounts and those of the quoted companies. After making the best adjustments and guesses possible at present, it seems to emerge<sup>1</sup> that on the definitions used in *National Income and Expenditure 1957*, the ratio of saving to total investment for the period 1949-53 for all companies was between 105 and 110 per cent.; for quoted companies—which represent roughly half the company sector—it was 91 per cent., and for the rest 118 per cent. Now, for the quoted companies, additions to cash and tax reserve certificates were equal to 11 per cent. of gross physical investment. It is probable, considering the rise in the value of turnover, that a similar policy was pursued by non-quoted companies. If so, this would account for the whole of the “surplus of saving over investment” in the company sector.

Much more evidence will have to be accumulated before one can speak with confidence about normal and abnormal rates of liquid asset growth. My impression is that, though the level of liquid assets held by companies was high throughout the period, the rate of growth—which is the point here—was moderate. Lacking any ratio of cash to turnover one can but compare the growth of liquid assets with other indices of growth. Total capital and reserves and total net assets both grew by 56 per cent., cash and tax reserve certificates by only 40 per cent. I find it misleading to describe funds devoted to a normal increase in liquid assets, in line with an increase in the value of sales, as a surplus being “lent” to other parts of the economy.<sup>2</sup>

Now, it is obvious that an increase in holdings of tax reserve certificates constitutes lending to the government sector. It is important to remember that the lending is short-term and that if company profits fall the amount of such loans will fall too, i.e. loans will be repaid. The treatment of additions to cash as lending to other sectors is much more questionable. It is true that a company which adds £10,000 to its cash instead of to its stocks does spend that much less, exerts that much less inflationary pressure and so makes room for £10,000 of spending in another sector. But if we adopt this approach we are bound to treat a company that runs down its cash in order to finance

<sup>1</sup> Detailed calculations will be found in *Studies in Company Finance*, *op. cit.*

<sup>2</sup> Cf. *Economic Trends*, February, 1958: “Throughout this period [1949-55], except for 1955, the company sector, as a whole, has been a net lender to the other sectors in the economy; on the other hand (except in 1952 and 1953 when investment was relatively low) the quoted companies have been unable to finance their investment needs at home and abroad from their retentions and have therefore been net ‘borrowers’”.

expenditure on stocks as "borrowing" from other sectors, or reducing its lending to them. This seems an awkward twisting of words, especially as one often wishes to compare such running down of cash and other liquid assets with normal borrowing as alternative methods of finance of expenditure. The normal connotation of lending includes a promise to repay: no such promise is implied when companies increase their cash holdings.

If the quoted companies were *deliberately* lending on a substantial scale to other sectors, I should expect this to be reflected in a substantial rise in their holdings of marketable securities. But in fact they devoted less than 2 per cent. of their gross sources of funds to this purpose. I should prefer to describe the period as one in which quoted companies financed a quarter of their growth of net assets by capital issues and in which they used their funds for investment overseas and for granting additional net trade credit and increasing their liquid assets as the value of their output rose. Unquoted companies naturally had to rely mainly on their retained profits to finance expansion, which probably also included a rise in liquid assets.

### III

We can analyse the behaviour of quoted companies according to their industry, their size or their rate of growth. Taking first the distinction by size, we find that 105 companies, each with assets of over £8 millions in 1949, account for half the net assets of all quoted companies. These "giants" prospered during the period 1949-53. Their profits increased at a rate of 12 per cent. per annum compound, as compared with 8 per cent. for the rest. They grew faster and their investment was larger in relation to their income. Little of their growth took the form of buying up other businesses; it was nearly all direct investment.

There have been a number of assertions that modern big business is becoming independent of external funds. If this were the case, traditional monetary policy would have lost a good deal of its power to influence industrial investment. Fortunately, in my opinion, the evidence is to the contrary. These giant companies made more use of capital issues than did the smaller companies; in other words they relied less on self-financing. Since 1955 capital issues have been even more important in financing the growth of all quoted companies.<sup>1</sup> Neither the giants nor the rest used much bank credit in the period 1949-53 to finance their growth; there is little difference between them in this respect.

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<sup>1</sup> Cf. "Company Finances after the Boom", S. J. Prais, *The Banker*, August, 1958.

Another assertion has been made about the finance of giant companies: that they must rely on self-financing because the capital markets are not able to supply the large sums they need. This has been said by some of those in the oil, steel and electrical engineering industries. Naturally, such statements cannot be refuted by the evidence of past capital issues. The evidence does suggest, however, that such views are exaggerated.

The largest companies in fact made rather *more* use than the rest of issues of debentures and other loan capital. Size, no doubt, is an advantage in this respect. As between quoted companies, however, there is little evidence that the smallest were at a substantial disadvantage in raising funds for expansion. Their balance sheets do not display, for example, the shortage of equity capital and heavy reliance on expensive and uncertain short-term debt which was evident among small firms in the United States in the 1930's. On the contrary, many of them raised fresh equity capital by issues to shareholders. In no less than seven industrial groups,<sup>1</sup> the average size of capital issue was less than £300,000.

A more detailed study (of 29 of these issues of less than £80,000 each) showed that in only one case did the costs of issue of ordinary shares to shareholders exceed 6 per cent. These issues were mostly made by companies with operating assets of under half a million pounds—in some cases under £200,000. They were evidence that small *quoted* companies were able to raise external funds at reasonable cost for the finance of growth. There are a number of disadvantages in having, as in London, a very large number of smallish companies quoted, in which dealings are difficult and jobbers cannot maintain a market as they do in the shares of large concerns, instead of confining the privilege of quotation to 1,000 or so leading corporations, as on the New York Stock Exchange. This evidence suggests, however, that to some at least of the small concerns the advantages of a quotation are real and valuable when it comes to raising funds for expansion.

#### IV

In any consideration of the finance of industry, facilities for rapid growth of firms with exceptional opportunities for expansion must be a point of interest. Indeed, it might be argued that the effectiveness of a capital market in providing funds for such expansion, where soundly conceived, while avoiding waste

<sup>1</sup> Cotton, clothing and footwear, building and contracting, wholesale distribution, retail distribution, entertainment and sport, and miscellaneous services.

of resources on wild-cat schemes of the South Sea Bubble variety, is one criterion by which it should be judged.

In the analysis of quoted companies at the National Institute, four groups of companies were distinguished, according to the rate of growth of their net assets as a percentage of their net assets at the beginning of the five-year period. Those whose net assets increased by less than 25 per cent. will be denoted as "slow" growers, 25 to 60 per cent. as "medium", 60 to 100 per cent. as "fast" and over 100 per cent. as "very fast".

For evidence of the financial strain caused by rapid growth, one can study the liquidity of the groups of fast-growing and very-fast-growing companies. These two groups both improved their net liquid positions<sup>1</sup> in the course of the five years. It is possible that such aggregates might be affected by the abnormal liquidity of a few large companies at the end of the period, due, for instance, to the receipt of proceeds of new issues. So we can measure the number of companies in each rate-of-growth group which were "highly illiquid".<sup>2</sup> Twenty-three per cent. of all companies were in this position, 19 per cent. of fast growers and 25 per cent. of very fast growers. Thus, it seems that rapid growth was achieved without undue strain on liquidity.

Another indication of financial strain is to be found in "gearing"—a high ratio of debt to equity capital. For the quoted companies, the test of gearing used was the proportion between net fixed interest payments and net income. No evidence of financial strain appeared in either of the two most rapidly expanding groups.

One effect of the inflation of the past twenty years has been greatly to reduce gearing in general. Total money profits have risen while the amount due each year to debenture holders, for instance, has remained the same. Thus, after such an inflationary period, there is great scope for the issue of loan capital without the gearing ratio being raised up to pre-war levels. Provided that the inflation has not been severe enough to discourage purchasers of loan stock and preference shares, sound companies with few prior charges have something like a hidden reserve of borrowing power. This may be a considerable source of strength to British industry if we should experience a period of stable or falling prices and keen competition in export markets. In the 1930's many companies, such as United Steel, were unable to carry out schemes of modernization and expansion which offered

<sup>1</sup> "Net liquid position" was defined as cash plus tax reserve certificates plus marketable securities less bank overdraft, dividends and interest due and current taxation, expressed as a percentage of net assets.

<sup>2</sup> Defined as net liquid position minus at least 10 per cent. of net assets—at the end of the period.

excellent prospects, even at the low levels of demand and prices for their products then ruling, because they were already so burdened with prior charges that they could not raise further funds. This was one important obstacle to progress in modernization and technical improvement. It is reassuring to observe that it is unlikely to recur at least in the immediate future.

The way in which rapid growth was financed without strain can be seen in some detail in Chart 3 (page 31), showing the finance of net investment.

Growth is measured in money terms. Prices were rising fast in this period—the official index of prices of final output rose by 24 per cent. between 1949 and 1953 and that of prices of fixed assets by 27 per cent. In *real* terms, therefore, the assets of the companies included in our group of “slow-growers” did not show any increase at all and may have declined. It is not surprising that this group made a net reduction in the amount of its preference and loan capital outstanding. (Security issues throughout are reckoned net of repayments).

Two other matters deserve explanation. In measuring the finance of net investment, a running down of liquid assets during the period is treated as a source of funds. For the slow growing companies it was quite an important source. A group, such as the fast growing companies, which actually added to their liquid funds during the period, had to finance that process as well as their investment. Adding to liquid funds has therefore to be treated statistically as a *negative* source of funds for the finance of investment.

The very fast growers depended heavily on new capital issues to finance their growth, such issues being almost equally divided between ordinary shares and other securities. Net saving provided a smaller proportion of the funds needed to finance their investment. Now, in theory, alternative dividend policies are open to a company growing rapidly. It may pay out only a small proportion of its profits as dividends and rely on retained profits to finance growth, as has been the pattern in Germany in recent years. Or, as in Australia in the decade of rapid industrial expansion since the war, consistently liberal dividend policies may be pursued in order to facilitate a series of new issues of capital and, in particular, of ordinary shares. Now, unless profits are exceptionally high, there is obviously a limit to the rate of growth that can be achieved by the former policy of reliance on retained net income; it might be described as one for fast growth; while *very* fast growth necessitates reliance on new issues. Thus it is interesting to note more reliance on retained net income among the fast growers and on

new issues of capital among the very fast growers. As one would expect, these companies growing very fast are notable for their use of issues of ordinary shares; but they also made more use of issues of preference and loan capital than other groups. Thus, this group would apparently be checked either by a log-jam in the market for new issues of fixed interest securities or by a big decline in the prices of ordinary shares. This is of some significance because in certain circumstances it has become evident that monetary and fiscal policies can produce the former result without the latter.

## V

To what degree does the nature of the expenditure—the uses of funds—by an industry influence the way it finances its growth—its sources of funds? In the six industries which grew fastest in this period, the main feature is a high level of new issues, whether expansion took the form of big additions to fixed assets, to stocks, or to net trade credit.

In all these industries, except engineering, new issues played an important part in the finance of growth, irrespective of the type of expansion, whether it was mainly in fixed assets, as in the chemical industry, or mainly in working capital, as in the electrical and wool industries. There is obviously no close correlation between new issues and net expenditure on fixed assets and big differences between industries in the proportion of their funds used for this purpose.

Thus, the electrical and chemical industries both financed a similar high proportion of their expansion by making new

TABLE I.  
*Certain Sources and Uses of Funds of Quoted Companies in the  
6 Fastest-Growing Industries, 1949-53*

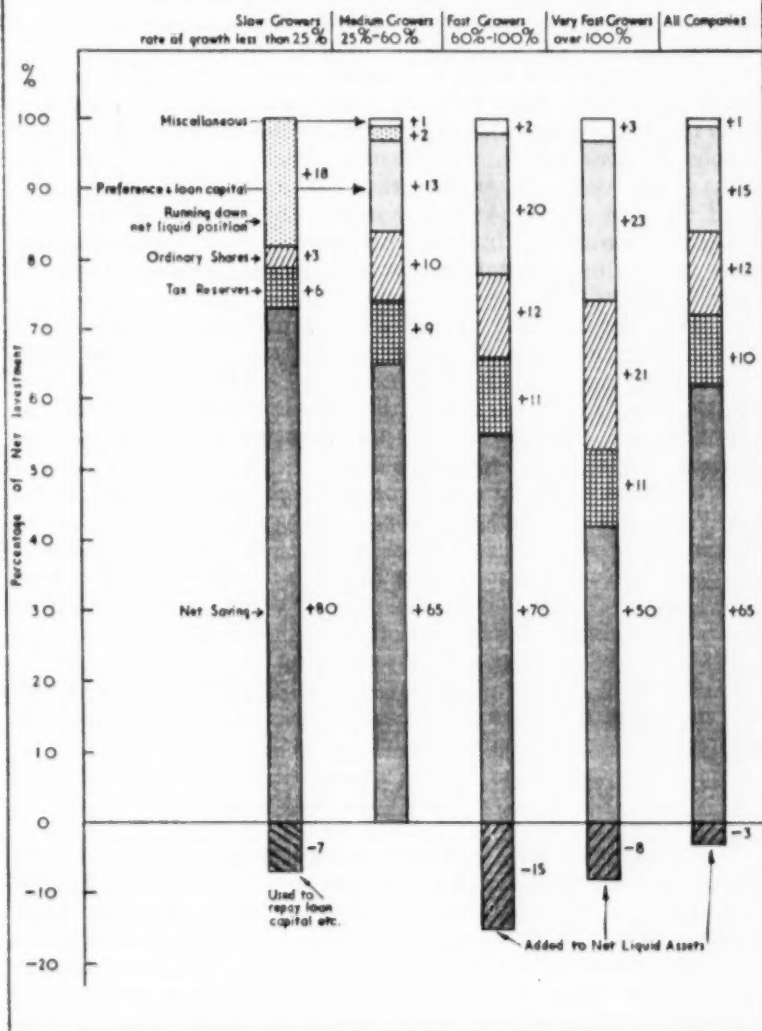
Industry	Rate of Growth (net assets) %	Aggregate proceeds of new issues as % of change in net assets	% of total uses of funds spent on:—				New issues as % of expenditure on tangible fixed assets less depreciation
			Tangible fixed assets less depreciation	Stocks	Net trade credit	Stocks and net trade credit	
Electrical	82	38	16	26	13	39	157
Wool	75	33	20	43	8	51	107
Vehicles	71	29	15	25	-3	22	70
Chemicals	60	39	38	18	6	24	73
Other metals	57	31	23	26	4	30	72
Engineering (non-electrical)	54	16	20	29	9	38	52



# HOW COMPANIES FINANCED EXPANSION

*Chart 3*

*Sources of Finance, by Rate of Growth*



issues—38 and 39 per cent.; but whereas only 16 per cent. of the funds of the electrical industry was spent on net tangible fixed assets and 39 per cent. on stocks and on net trade credit, in chemicals 38 per cent. was spent on net tangible fixed assets and only 24 per cent. on stocks and net trade credit. It would be misleading to take net investment in fixed assets as an index of expansion when discussing financial problems, however important it may be for questions of real output.

In certain industries, of course, short-term credit is much more important; none of these grew fast in this period. Three such industrial groups were tobacco, clothing and footwear, and wholesale distribution. In tobacco, stocks amounted to four-fifths of net assets and in the other two industries to about half. Half the cost of the *increase* in stocks during the period in the tobacco industry was financed by *increased* bank overdrafts, one-fifth in clothing and footwear and a quarter in wholesale distribution.

Thus the fact that the industries which grew rapidly in this period were those which rely more on long-term than on short-term credit appears to be one reason for the small growth of bank credit. There are some industries in which companies use a lot of bank credit; they continued to use it to finance their growth, but that growth was slow.

In the United States, by the development of the "term loan" made for a period of one to ten years and often used for the purchase of plant and machinery, banks have continued to supply a substantial volume of funds to fast-growing industries which spend heavily on fixed assets. Now that credit restrictions have been relaxed, the introduction by British banks of a similar facility available to concerns producing for the home market and not, as hitherto, only to exporters might prove most valuable if a high rate of expenditure on new and improved productive equipment is to be maintained.

## VI

Trade credit is a large item in the accounts of quoted companies and its significance is not easy to assess. In 1953, £1,218 millions was due to trade creditors, compared with £270 millions to banks. Even net trade credit outstanding—the excess of debtors over creditors—at £370 millions was considerably greater than bank debt. Thus the quoted company sector had extended £100 millions more credit to others than it had received from the banks.



It would be possible for a substantial reduction in bank advances to be offset by an expansion of trade credit no greater than that which occurred in this period. Thus, these quoted companies in 1953 had overdrafts of £270 millions and were giving £370 millions net trade credit. If their overdrafts had been reduced by 10 per cent.—£27 millions—and if trade credit had increased by the same amount, this would have represented an increase of 7 per cent. in net trade credit and only 2.2 per cent. in gross trade credit. Such an increase of £27 millions may be compared with the average annual increase in net trade credit over the period 1949–53 of £45 millions. Now of course such an increase in trade credit granted to some firms must be financed by others. But as we have seen the general level of company liquidity was high. An amount of £27 millions could have been found in 1953 by a reduction of only 8 per cent. in holdings of marketable securities.

It is also possible that action to check inflation by the monetary authorities may lead to a contraction of trade credit. As the chairman of the Federal Reserve Board explained, "credit restraint has an important deterrent effect . . . because availability of credit is less certain and liquidity positions must therefore be strengthened to meet possible emergencies or to insure fulfilment of future plans". Because the volume of trade credit is so large, a contraction—or even a check to the normal rate of growth—would prove a powerful influence.

Now which of these two very different results will ensue must surely depend mainly on the degree of determination with which a policy of credit restraint is applied. If the policy is partial—a reduction confined to bank advances, with little attempt to check the general level of consumer demand or government spending by fiscal policy—it seems most probable that trade credit will expand to replace bank credit in some degree; such a policy may fail. If it is sufficiently broad and thorough to induce a general downward revision of expectations, then the contraction of trade credit may prove to be one significant way in which it succeeds.

R. F. Henderson.

*Corpus Christi College,  
Cambridge.  
December, 1958.*

## Sampling as an Exact Science

*By M. G. Kendall*

THE traditional method of acquiring knowledge about an aggregate of individuals, especially in the economic field, was to enumerate them all. The oldest official sources of information about the United Kingdom, relating to population and foreign trade, depend on a complete count of human beings or of goods passing through the ports. Until quite recently governments were entirely census-minded. The major statistics of agriculture, production, distribution and labour force are all based on the census approach. Even for prices, where an exhaustive enumeration of each transaction is impossible to carry out, the tendency has always been to include as much as possible and to spread the cover of an index-number over as many commodities as could conveniently be included.

But censuses are expensive, even in a small country like ours. We do not attempt a population census more than once every ten years. What is just as bad, a census may defeat its own object by resulting in such a mass of information that the collectors are snowed under. It takes several years to analyse and publish the results of a population census, even with all the computational aids of modern electronics. The census-taker is always struggling against the problem of "too much, too late". This difficulty has, in fact, been felt so keenly that preliminary figures based on a sample of one-in-a-hundred have been issued by the census departments; and small as is the one per cent. proportion, there can be no doubt that these figures are accurate enough for a good many purposes.

If we look further afield the problem of the census-taker becomes much vaster. The problem of acquiring comprehensive demographic or economic information in a country like India is so complex that a census may be practically impossible. Such countries are compelled to adopt sampling methods, not merely to save time or money, but as a sheer necessity. It is for this reason that in the so-called under-developed countries sampling methods are being intensively developed at the present time. UNO has found it desirable to set up a special sub-commission on sampling to foster this movement.

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The author is Professor of Statistics in the University of London.

Sampling techniques are not, however, confined to the eliciting of social or economic facts. The same sort of considerations which force them to the attention of the social statistician apply *mutatis mutandis* in industry. A manufacturer of component parts may not have time or resources to test every item which he produces; there may even be theoretical reasons why he could not test every item if he wished, as for example if he is manufacturing bullets (the only satisfactory way of testing a bullet being to fire it). A manufacturer of a new kind of fertilizer cannot apply it to every plant on every soil under every kind of climate; he has to test it on a sample of conditions. In this article I shall not have much to say about the industrial or scientific applications of sampling methods, but it is as well to remember their existence. I shall be concerned mainly with the sampling of human beings or human activities, which raises its own problems and requires a somewhat specialized expertise.

The drawing from a sample of correct inferences about the aggregate from which it emanated is a vast subject on which large books can be, and have been, written. But basically all this proliferation stems from one very simple problem. We wish to know something, or to assert something, about a "population". Deliberately we examine only a part of it, usually quite a small proportion. How do we know that we are not making a gigantic mistake in neglecting the unexamined members? If we proceed on the basis of the sample must we be for ever looking over our shoulder in case we have missed something? Are we taking a sensible chance or are we just gambling on the possibility that our sample is representative?

There is, as we shall see later, a satisfactory answer in philosophy to these questions. But it might as well be pointed out now that even people who express the gravest misgivings about sampling during a philosophical discussion are quite content to rely on sampling in their ordinary daily lives. The milk we drink for breakfast may have been tested—on a sampling basis. The newspaper we read may advocate a policy based on a sample poll of the adult public. The material of the suit we wear was probably chosen by looking at a sample, perhaps of only a few square inches. And so we could go through the day, pointing out how much the quality of the goods we use and the facts which we employ in reaching decisions are based on some sampling procedure or other. Philosophy or not, the thing works in practice.

But only up to a point. We could equally easily go through

the day examining the cases where we can be misled by the wrong kind of sample. Every schoolboy knows enough not to judge a basket of fruit by the specimens on top. Every reader of a newspaper must doubt whether the readers whose letters are chosen for print are really representative of opinion in general. No doctor would regard his patients as a fair sample of the population on any matter concerned with health or related to it.

The sampling problem in essence is relatively simple to describe. We require, in the first place, to lay down conditions under which a sample is a good one: that is to say, is reliable. Having done that, we require to know how far we can rely on it; or, to put the matter in a way which more frequently arises in practice, we need to know how big the sample should be, or what kind of cover it should have, to enable us to reach the sort of decision at which we are aiming. Armed with criteria which will decide such points, we can proceed to the next stage of sample design, which will provide us with the right kind of sample at minimum cost in money, time, staff or effort. We require the maximum amount of information with the least expenditure of resources.

### BIAS IN CHOICE

Long and painful experience has shown that haphazard choice is not enough to secure an unbiased sample. It is obvious enough that deliberate selection may bias a sample—nobody would form a view about personal expenditure on tobacco by asking men alone, or men and women in a particular age-group alone. It is not so obvious that if an observer picks out individuals haphazardly he may, quite unconsciously perhaps, bias the sample.

Suppose, for instance, that we are interested in finding out how often people go to a cinema. One simple way of getting a sample would be to select a fairly busy street in a town, to stop people and to ask them. Let us assume for the purposes of the example that they are all willing to give the information and give it correctly, and that we avoid the more obvious sources of bias by spreading our sample equally over men and women, and so far as possible over different age-groups. Our sample may still be a rather poor one. In fact, by virtue of our method of approach, we can only contact those people who are out and about in the street. But some classes of person in whom we are interested are less likely to be so than others—for example, old

age pensioners and mothers with small children; and these may also be persons who are less likely to visit the cinema because of their tendency to remain at home.

Once such effects are pointed out, of course, they are easy to appreciate. Biases of such a naive type are rarely met with nowadays except when amateurs attempt a survey. But there are more subtle effects of a similar kind to which any survey is liable unless it submits itself to a most rigorous discipline in the choice of the sample members. An interviewer who is given a list of houses to visit, for example, has to be cautioned against visiting the one next door to an assigned address if there is no reply to his knock at that address. One can see the argument from his point of view: if the houses were chosen haphazardly, the choice might just as well have lighted on the house next door as on this one, so why not take it? But obviously serious bias may appear if the quality "being-at-home" is in any way related to the quality under investigation in the survey.

In fact, there is only one way to remove all possibility of bias due to bad selection: that way is to choose the sample so that every member of the population has an equal chance (or, at least, a known chance) of being included in it. This is known as "random" or probability sampling. It removes from the interviewer, or whomever controls the sampled members, any element of personal choice and makes him work to a fixed set of rules. It is in the setting up of these rules, adapted to the particular requirements of the enquiry, that the primary part of the sampling design consists.

Probability sampling does not necessarily mean that, so to speak, we put all the names of the population in a gigantic hat and pick out a number at random. It may proceed in stages. For example, if we wanted a sample of individuals in England we might first of all choose a number of counties at random; then, within each selected county choose a number of areas (say, polling districts) at random; and then, within each selected polling district, choose a number of names from the appropriate electoral register. This, properly done, will yield a sample such that every member of the population has the same chance of being chosen. It is true that certain counties will not appear at all; but they had a chance of doing so and in the long run will do so when the sampling is repeated.

A doubt will strike the layman at this point. Suppose we pick ten out of 50 counties and by chance they all fall in the South of England. Can this give us a representative sample? It may be random and the event may be unlikely. But what

if it does happen? It is rather poor consolation to be told that things will right themselves in the long run. He may not be proposing to have a long run.

The statistician's answer to this is known as "stratification". If we wish to make sure that all parts of the country are represented we can, if necessary, allocate our sample to each county proportionally to the population of that county. Or more generally, we can allocate the sample proportionately to the eleven regions of the Registrar General and then pick counties at random within each region. The extent to which this is done depends on the nature of the enquiry and what we know about the area we are exploring. In most cases we might well expect geographical differences between individuals and it would be prudent to stratify, and hence *restrict* the randomness of the sampling. This conditional kind of probability sampling does not destroy the central property of freedom from bias.

A similar procedure can be applied to cases where "individuals" are of different sizes. Suppose, for example, that we are estimating the area under wheat, the "individual" in this case being the farm. If we picked farms at random we should get a lot of small ones and a few large ones; but our estimate would obviously be very sensitive to the number of large ones and we should not want to miss the occasional very large one. We overcome this by simply grouping our farm into strata by size; and there is nothing to prevent us from taking a different sampling fraction from each, selecting, say, one in a hundred from those of 50 to 100 acres and every one of those above 1,000 acres. By balancing the stratification and the randomness in this kind of way we can, in a sense, get the best of both worlds, always without incurring the risk of bias.

### BIAS IN RESPONSE

In modern sampling inquiries bias in selection is usually under adequate control. It is nearly always possible to set up a sample design which will reduce the selection bias to negligible proportions. Admittedly, occasions arise when this may be expensive, and sometimes cheap and quick methods are employed with foreknowledge that there is some risk of bias. More difficult to control are the errors which may occur between the selection of the sample which it is hoped to achieve and the final data yielded by it.

One of the most troublesome sources of error is that due to



non-response. You can pick a sample of human beings but you cannot compel them to give information. In actual practice non-response is not so great as might be expected. Most people like being interviewed if it can be done at their own time and convenience. The average survey, nowadays, when done by experts, may be expected to result in a response rate of from 75 to 90 per cent. Nor is the non-response all due to refusal. Some may be due to death, illness or incapacity (e.g. deafness); some may be due to absence or change of address. Refusal to give information is often only of the order of 5 per cent.

Enquiries which are not conducted by interview may, however, have a much higher non-response rate. The standard example is that of the postal enquiry. The rate here varies very much with the nature of the enquiry and the prestige of, or indirect pressure exerted by, the sponsoring organization. The non-response rate in some enquiries may be as high as 70 per cent.; and if there is any possibility that the non-response group differs materially from the respondents, the possibility of a bias is obviously so great as to cast grave doubt on the generality of any conclusions drawn from the sample.

It is, of course, one thing to persuade respondents to answer. It is another thing to be sure that they answer correctly. This is not to say that people deliberately falsify their replies or, even when they do, that they can be fairly said to be lying. Great care has to be taken to frame the questions properly. Efforts have to be made to prevent respondents from giving replies which they think the interviewer expects. The promptings of vanity and prestige have to be removed. Validity checks have, where possible, to be built into the questionnaire or established separately. It is on such matters that enquiries cease to be matters of statistics and become matters of psychology. They are all subject to prolonged study by organizations conducting social surveys. They are not, however, problems of sampling as such. They can, and do, occur quite as much in censuses.

In fact, there are occasions when enquiry by sample is preferable to enquiry by census—simply because much more care can be taken to ensure the accuracy of information obtained by a sample. The scale of operation under a census is often such that temporary inexpert staff has to be recruited for it and little time can be allotted to each individual respondent. It may be better to concentrate only on a sample but to do that sample thoroughly. What is lost in sampling may be more than gained by increased accuracy.



### PRECISION IN SAMPLING

I have stressed the primary importance in probability sampling of avoiding bias. The method has one other fundamental advantage of equal importance. With this method, and with this method alone, can we assess the precision of our results in objective terms.

Again, the essential point is a very simple one with which every adult is familiar. Suppose we take an office list containing, say, 400 surnames. We find that 30 of them begin with the letter M. Unless our company has some extraordinary principle of recruiting its personnel (such as a preference for Scotsmen) we may suppose that our sample of 400 is a random one and, noting that 7·5 per cent. have the initial M, we might estimate that this is the proportion for the population of employees at large in England. But might the true proportion not be 7 or 8 per cent.; or 6 or 9 per cent.? In an intuitive way we feel that the further we go from the observed 7·5 per cent. the less likely we are to be right. And this is correct. All that the theory does is to express this feeling in exact terms by putting a limit on the permissible deviation in terms of probability. It may be shown as a matter of mathematics that, if this sample really is random, the odds are about 1 to 3 that the true proportion lies in the range 7–8 per cent.; about 3 to 1 that it lies in the range 6–9 per cent.; and about 15 to 1 that it lies in the range 5–10 per cent. If the sample were 4,000 instead of 400 the odds would be much increased; the odds that the true population lay between 7–8 per cent. would be 3 to 1 on; and that it lay between 6–9 per cent. would be over 600 to 1.\*

The limits set by statisticians to the accuracy of their estimates are usually expressed in terms of a quantity called a "standard error" and the formulae for calculating it can be very complicated, especially for a multi-stage sampling design. In principle, however, the idea is the one we have just illustrated; we calculate the chances that the true value lies in a given range. What odds we are prepared to accept is to some extent a matter of taste. A more cautious individual may require higher odds; but if so he has either to accept a wider band of error or increase his sample size. Thus, although we cannot make a statement from sample to population with the certainty of deductive logic, we can make quite precise statements in probability, and these are, for most practical purposes,

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\*An account of how these odds are calculated is given in an Appendix to this article on page 43.

sufficient. In any case, we can measure their reliability in terms of chances.

### A PRACTICAL EXAMPLE

Suppose we want to examine some aspect of all the current bank accounts of private individuals in England and Wales. There are several millions of them; apart from time and money, there are all sorts of practical difficulties about a complete enumeration and in any case the resulting analysis might require so much labour that by the time we had finished it the results would be out of date. So we decide to take a sample. How do we proceed?

This is the sort of question which is often put to a statistician, but before he can answer it he has to be given some more specific information. What aspects of current accounts are of interest? Is an instantaneous snapshot of the situation at some point of time enough, or must the inquiry cover a period (as, for instance, would be necessary if we were interested in the frequency of drawing cheques)? Are we concerned with the accounts of single individuals, or do we include joint accounts, trustee accounts and business accounts? What sort of use is to be made of the results? And, perhaps the most difficult of all, how accurate are the results to be: within one per cent. or five per cent. or ten per cent. of the truth? In practice it is not always easy to get clear-cut answers to all those questions. But the sampler has to get as much prior information as he can.

At the risk of over-simplification, suppose we want a sample of private accounts standing in the names of individuals, to estimate the amounts which are paid out of such accounts under bankers' orders. We may be interested not only in the amounts involved but in the dates on which the payments are made; for they tend to cluster at certain points, such as the last day or the first day of the month. Obviously an inquiry addressed to the position on a given day is not enough. We must spread the examination of individual accounts over a period and (since some bankers' orders are annual) we will suppose that it is considered necessary to examine any particular account over a full year.

We know more or less what we want. The next question is, how accurate do we want to be? Suppose we are content to have a ten-to-one chance that our estimates are within five per cent. of the truth. We may still be unable to determine the sample size with any exactitude, because the sampling variation depends on the dispersion of the values we are measuring about

their average as well as on that average itself. We look for prior information on this point among previous inquiries; and if it is not forthcoming we may have to do a small pilot survey to obtain it. When we have it (and great precision is unnecessary at this stage), we may put a figure on the sample size. Let us suppose that 2,000 accounts are considered sufficient. This may sound a very small proportion—perhaps only about one in three thousand. It is sometimes hard to convince a layman that such a sample will be anywhere near accurate enough. But the accuracy depends on the size of the sample, not on the proportion which it bears to the whole collection from which it is drawn, and for many purposes 2,000 would be sufficient. We will suppose that we decide to call for a sample of 20 from 100 different branches of the banks participating in the inquiry.

Our final stage is to plan the drawing of the sample so that we get as good a cross-section of individual accounts as possible. There is a surprising amount of flexibility here in the choice of method. We should probably wish to spread the inquiry geographically and so stratify by region. Furthermore, if we suspect that our bankers' orders vary in intensity as between rural and urban districts, we should also stratify by urban, semi-urban and truly rural districts. We then have a rather complicated stratification by at least two factors. Lack of space forbids a detailed description of how the sample of branches would be set up, but it is not a very difficult operation.

Finally, having got our sample of branches, we sample, say, 20 accounts within each branch. This might be done by selecting 20 at random. In practice we should probably draw up a list of accounts in alphabetical order and take one every so often. Thus, if there were 1,000 accounts altogether and a sample of 20 were required, we could take every 49th, starting at some random number between one and 20. A more refined and perhaps a better method would be to stratify the accounts by size before carrying out this process in each stratum. Accounts, like the farms aforementioned, consist of many more small than large ones, and to reduce the sampling error we should probably prefer to apply a different sampling fraction to each stratum.

In this particular case matters are simplified for us by the fact that there would be no errors due to non-response, all chosen branches being obliged to comply with headquarters instructions, and there being no transcription errors (or so I should hope), a banker's order being an easily identified object. And so we should proceed to build up the sample and to the analysis of the results.

Finally, we should proceed to calculate standard errors in order to assess the precision of our results. If our design was a good one these errors will be as small as they could be for the outlay of time and money which we have incurred.

In sum, our sampling operation will have been conducted on scientific lines and will yield an answer in scientific terms. Sampling nowadays is no longer (or need not any longer be) a hit-and-miss process. From the nature of the case we cannot, perhaps, be sure of hitting the target plumb in the centre every time; but we can be sure of registering somewhere close, or close enough; or, what may be just as important, we can tell before we shoot whether it is worth trying to hit the target at all. Economy in the sampling domain is not always achieved by minimizing outlay on an inquiry; it may derive from the fact that it is possible to say that an inquiry is not worth holding.

M. G. Kendall.

*The London School of Economics.*  
November, 1958.

## APPENDIX

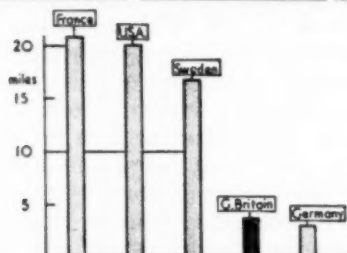
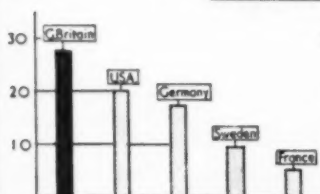
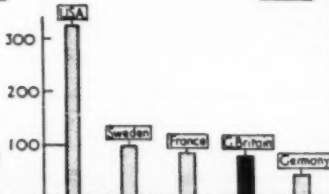
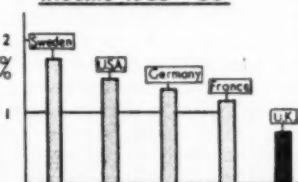
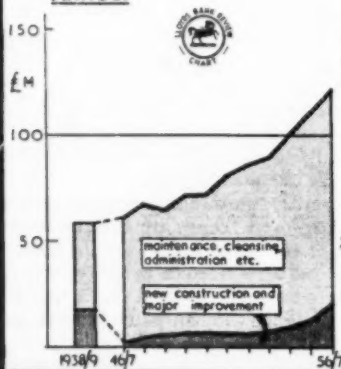
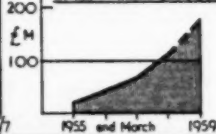
*Note on the calculation of the probabilities in the text:—*

When an estimate of some parental quantity is made from a sample, the estimating quantity, say  $t$ , has what is called a sampling distribution. This consists of the set of all values which the estimate could take for all the different possible samples. Most of these will be near the true value, but as we get further away from it, the frequency of estimates falls off. In general, the estimates have a distribution in the form of a bell-shaped curve, called the "normal" or "Gaussian" distribution.

The precision of an estimator is measured by the relative dispersion of this distribution; a narrow curve corresponds to high precision, in which the estimates are closely grouped round the true value; a broad curve corresponds to lower precision in which the estimates can vary more widely. Generally speaking, the precision varies as the square root of the sample number. Thus to double the precision (or, equivalently, to halve the spread of the distribution of estimates) we have to quadruple the sample size.

The actual probabilities depend on the mathematical properties of the normal distribution, which are well explored. Doubling the precision does not mean doubling the odds in favour of any *given range* of the variable under estimate. In general it increases those odds more than proportionately. On the other hand, if we are working to *given odds* (say 3 to 1 on) a quadrupled sample size will halve the range within which we can place our estimate.

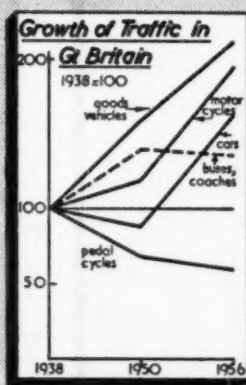
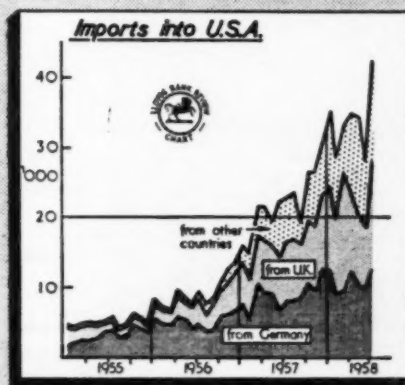
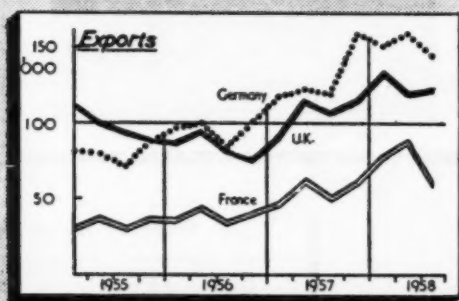
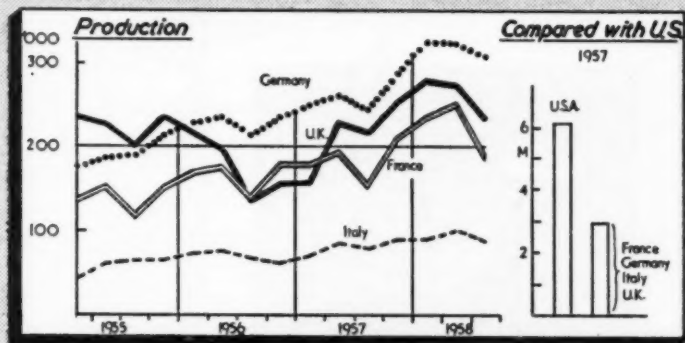
## ROADS

Roads: Miles per Thousand PeopleMotor Vehicles per Mile of Road: 1956Cars per Thousand People: 1956ExpenditureAs percentage of National Income 1953 - 55AnnualNew Construction etc. Value of Works Outstanding

SOURCES: British Road Federation  
International Road Federation

The serious inadequacy of our road network is brought out by the above charts. Allowing for differences in population, Britain has only a quarter of the cars that America possesses, yet the roads are *more* congested here than in the U.S.A.

# CARS



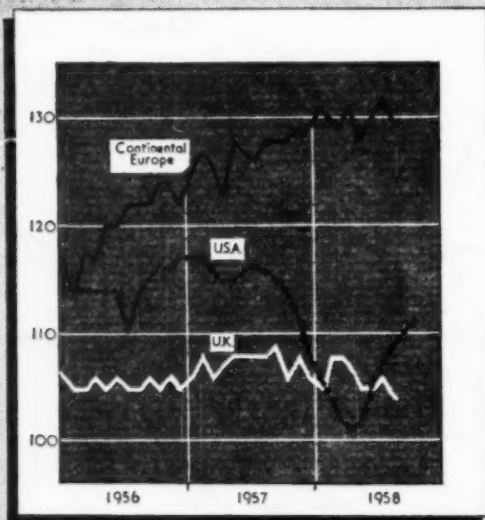
SOURCES: Society of Motor Manufacturers & Traders.  
British Road Federation

Since 1956 Germany has been ahead of this country in both the production and export of cars, although we now have a slight lead on Germany in the American market. American imports of British cars have increased remarkably over the last three years. In the first 10 months of 1958 we exported 122,000 cars to the U.S.A., against only 28,000 in the same period of 1956.

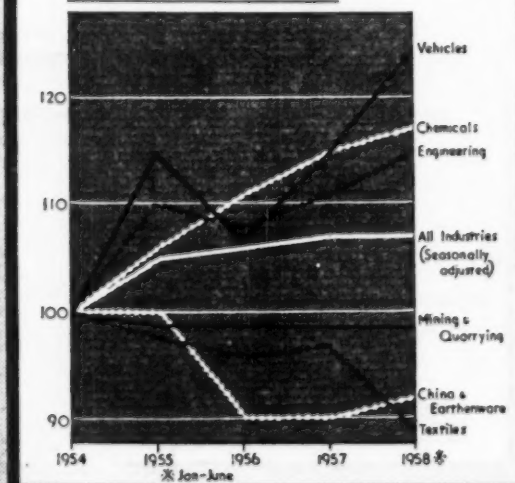


# INDUSTRIAL PRODUCTION

1954=100



## U.K. Selected Industries



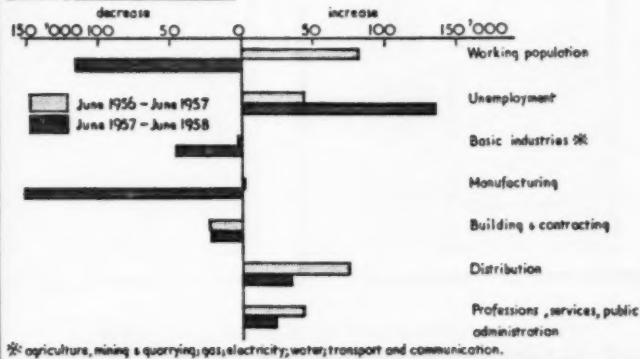
SOURCES: Monthly Digest of Statistics  
O.E.E.C. Statistical Bulletin

While industrial production in the U.K. has turned down in recent months, and levelled off in Continental Europe, the U.S. has seen a sharp recovery from the low point touched last spring. In November the index of production rose 3 points to 141, only 5 points below the end—1956 peak.

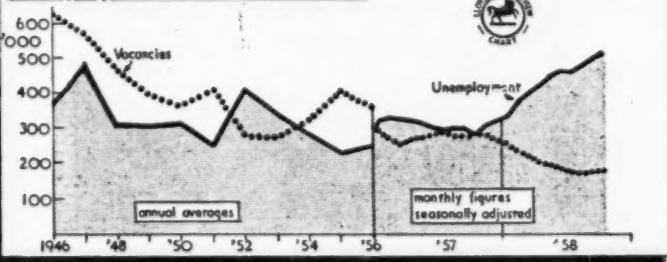


# MANPOWER

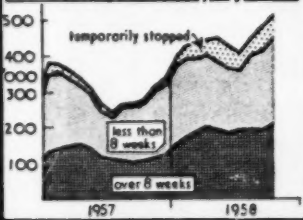
## Changes 1956-1958



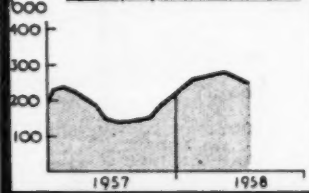
## Unemployment and Vacancies



## Duration of Unemployment



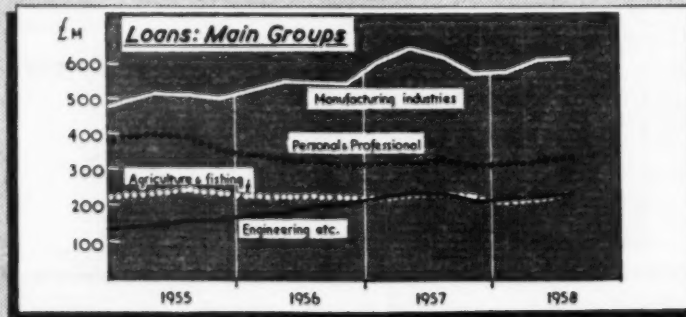
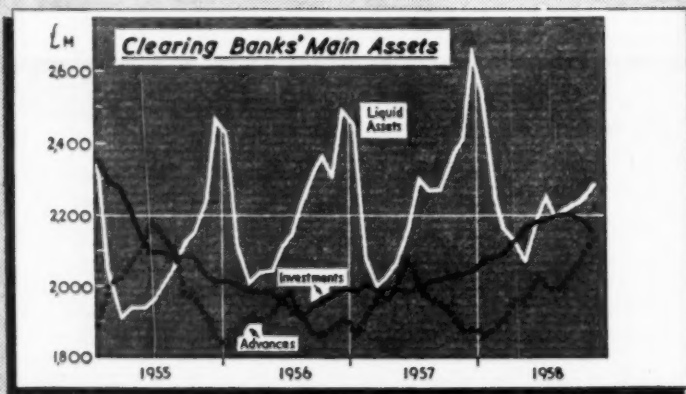
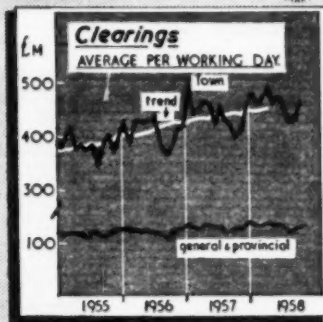
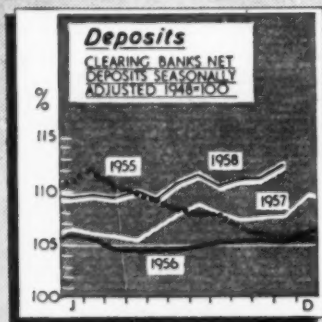
## Claims for Unemployment Benefits



SOURCES: Ministry of Labour Gazette  
 Monthly Digest of Statistics

Unemployment has risen steadily over the past year but in November was still equivalent to less than 2½ per cent. of the labour force. The numbers employed in manufacturing fell by more than a quarter of a million over the twelve months to October.

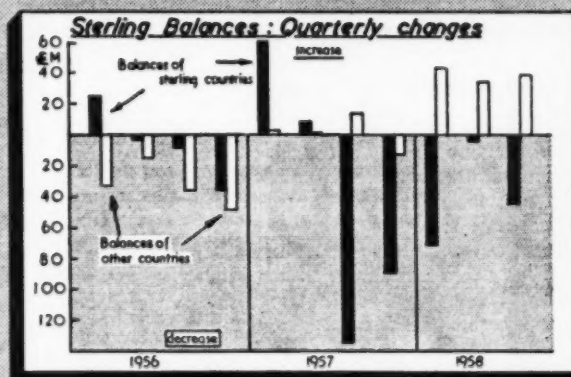
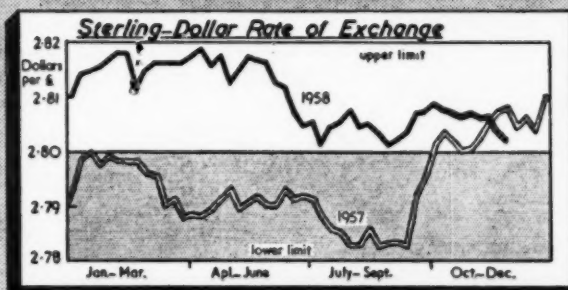
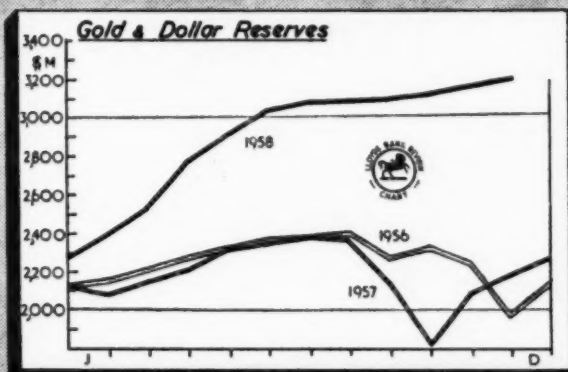
## BANKING



SOURCES: Committee of London Clearing Bankers,  
Bankers' Clearing House, British Bankers' Association.

Following the relaxation of credit restrictions, bank advances rose by about 7 per cent. in the three months to November. Lloyds Bank's seasonally-adjusted index of deposits reached a new peak in that month but during the past year the expansion in deposits has fallen well short of the incoming gold to be financed.

## EXTERNAL POSITION

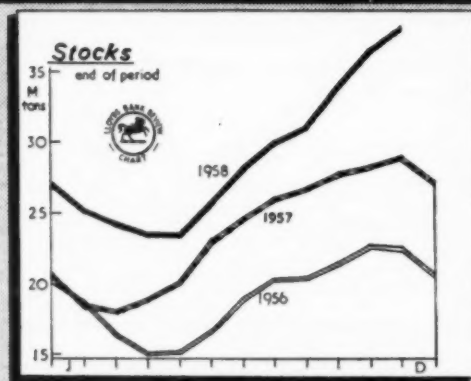
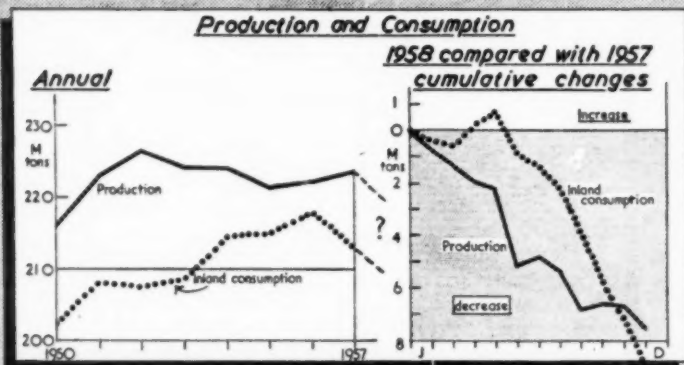


SOURCES: Treasury  
Monthly Digest of Statistics

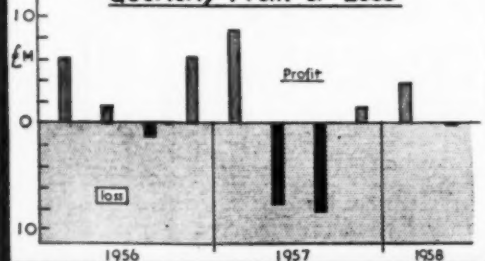
There has been a dramatic improvement in our external position over the past year. At the end of November the gold reserve was nearly 75 per cent. greater than in September 1957, sterling liabilities have been reduced, while we had a merchandise export surplus in the first half of 1958 for the first time this century.

# COAL

## *Production and Consumption*

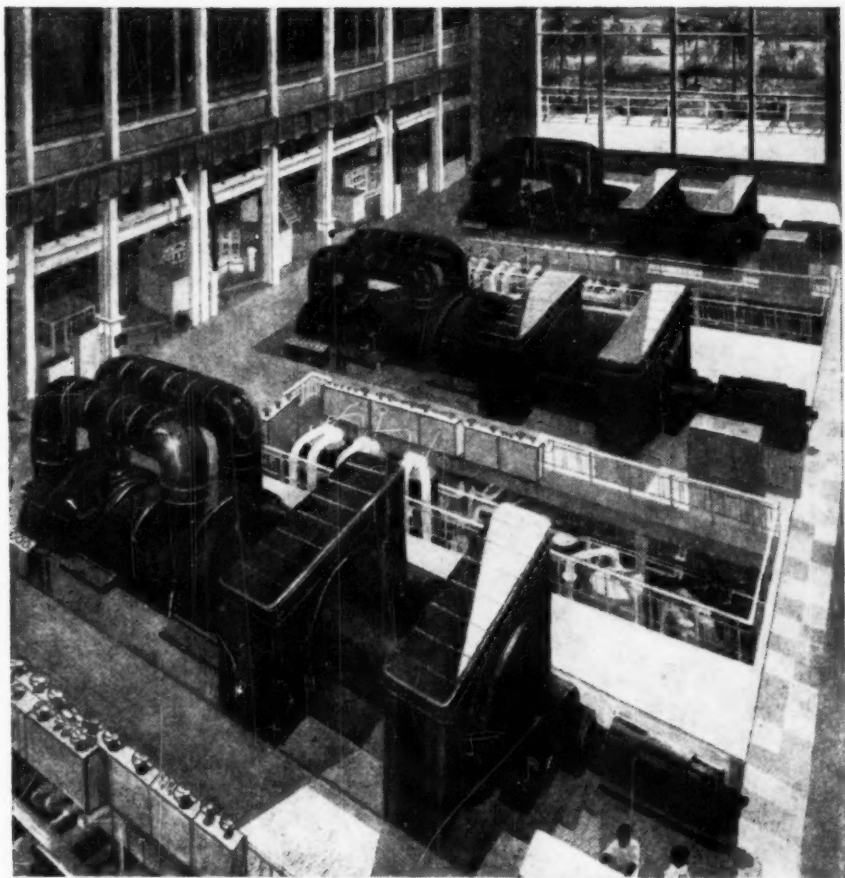


## *National Coal Board: Quarterly Profit or Loss*



SOURCES: Ministry of Power  
National Coal Board

In the first eleven months of 1958 coal output was about 7½ million tons lower on the year, while home consumption fell by 9 million tons. Stocks, in contrast, were 9 million tons higher than a year ago.



## Earning our keep

### BRITISH ELECTRICAL EQUIPMENT OVERSEAS

Four times as much heavy electrical equipment—generators, switch gear, transformers and so on—is exported by Britain today as before the war. A score of leading manufacturers and some hundreds of smaller firms make up the electrical industry, which directly employs over 200,000 people and sells fully a quarter of its products overseas.

In many cases this export trade has only been possible because British manufacturers were able to offer special credit terms extending over several years.

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